Name:

at1117paper: Complete the Square (v325)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 56 feet. Their combined area, found by adding the square's area and the rectangle's area, is 1716 square feet. What is the value of x?

Example's Solution

$$x^2 + 56x = 1716$$

To complete the square, add $\left(\frac{56}{2}\right)^2 = 784$ to both sides.

$$x^2 + 56x + 784 = 2500$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 28)^2 = 2500$$

Undo the squaring.

$$x + 28 = \pm\sqrt{2500}$$

$$x + 28 = \pm 50$$

Subtract 28 from both sides.

$$x = -28 \pm 50$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 22$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 40 feet. The total area, of the square and rectangle, is 825 square feet. What is the value of x?

$$x^2 + 40x = 825$$

$$x^2 + 40x + 400 = 1225$$

$$(x + 20)^2 = 1225$$

$$x + 20 = \pm 35$$

$$x = 15$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 16 feet. The total area, of the square and rectangle, is 132 square feet. What is the value of x?

$$x^2 + 16x = 132$$
$$x^2 + 16x + 64 = 196$$
$$(x + 8)^2 = 196$$
$$x + 8 = \pm 14$$
$$x = 6$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 54 feet. The total area, of the square and rectangle, is 1771 square feet. What is the value of x?

$$x^2 + 54x = 1771$$
$$x^2 + 54x + 729 = 2500$$
$$(x + 27)^2 = 2500$$
$$x + 27 = \pm 50$$
$$x = 23$$